

BITS, Pilani – Dubai
Dubai International Academic City, Dubai

Fourth Year (Computer Science)
First Semester, 2007-2008

Quiz 2

Course No: CS UC471
Duration: 20 minutes

Course Title: Computer Graphics
Max. Marks. 10

ID No.

Name:

1. For which of the following the direction of projection not specified?
 - a. Orthographic projection
 - b. Oblique projection
 - c. Axonometric projection
 - d. Perspective projection

2. In which of the following can we see only one of the faces of the object?
 - a. Cabinet projection
 - b. Cavalier projection
 - c. Front Elevation
 - d. Perspective projection

3. What is the angle (in degrees) made by the direction of projection with the projection plane in the case of cavalier projections?
 - a. 0
 - b. 45
 - c. 63.4
 - d. 90

4. In which type of projection do we get equal foreshortening along three principal axes?
 - a. Isometric projection
 - b. Cabinet projection
 - c. Cavalier projection
 - d. Perspective projection

5. Which of the following specifies the projection plane (view plane)?
 - a. VUP & VRC
 - b. PRP & VPD
 - c. COP & DOP
 - d. VRP & VPN

6. Which of the following is used as the centre of projection in the case of perspective projection?
 - a. VUP
 - b. VPN
 - c. PRP
 - d. VRP

7. What is the purpose specifying front and back clipping planes?
 - a. To specify the view volume
 - b. To specify the direction of projection
 - c. To eliminate hidden portions
 - d. To specify the type of projection

8. Which parameter is used for eliminating objects too far from the observer in the synthetic camera model?
 - a. Front clipping plane
 - b. Back clipping plane
 - c. VRP
 - d. VUP

9. What is the shape of the view volume in the case of perspective projection?
 - a. Rectangular box
 - b. Frustum of a pyramid
 - c. Cone
 - d. Cylinder

10. Which parameter is to be changed in the synthetic camera model to get the effect of zooming in perspective projection?
 - a. VUP
 - b. VRP
 - c. VPN
 - d. NPC



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Fourth Year (Computer Science & Engg.)
First Semester, 2007-2008

Quiz 1

Course No: CS UC471
Duration: 30 minutes

Course Title: Computer Graphics
Max. Marks. 10

ID No.

Name:

1. How many pixels are displayed by the midpoint line algorithm while drawing the line joining the points (x_1, y_1) with (x_2, y_2) ?
 - a. $|x_1 - x_2 + 1|$
 - b. $|y_1 - y_2 + 1|$
 - c. $\min(|x_1 - x_2 + 1|, |y_1 - y_2 + 1|)$
 - d. $\max(|x_1 - x_2 + 1|, |y_1 - y_2 + 1|)$

2. For which of the following values of slope will the line drawn by the midpoint line algorithm show "staircase" effect?
 - a. 0
 - b. 1
 - c. 2
 - d. Infinity

3. What is the starting point in the midpoint circle algorithm for drawing the circle $x^2 + y^2 = R^2$?
 - a. $(R, 0)$
 - b. $(0, R)$
 - c. $(0, 0)$
 - d. (R, R)

4. In the scan-line algorithm for filling polygons, the active edge table (AET) is kept sorted on which value?
 - a. x intersection value
 - b. y_{\max}
 - c. y_{\min}
 - d. $1/m$

5. The outcode used in the Cohen-Sutherland line clipping algorithm is formed by four bits representing the classification of a point w.r.t. the top, bottom, right, and left edges of the clipping rectangle. Which of the following is not a possible value for the outcode?
- 1010
 - 0101
 - 1001
 - 1100
6. Which of the following is not true about the Sutherland-Hodgman polygon-clipping algorithm?
- It is based on divide-and-conquer strategy.
 - The output may be a disconnected polygon.
 - It has exponential time complexity.
 - It can handle convex as well as concave polygons.
7. In polygon scan conversion algorithm, if the scan line passes through a horizontal edge, its vertices are
- never counted
 - always counted
 - counted, if it is a top edge
 - counted, if it is a bottom edge
8. What is the condition for trivial rejection of a line segment with endpoints having outcodes c_0 and c_1 in the Cohen-Sutherland line-clipping algorithm?
- $c_1 | c_2 == 0$
 - $c_1 \& c_2 == 0$
 - $c_1 \& c_2 == 1$
 - $c_1 | c_2 == 1$
9. What is the maximum number of iterations performed by the Cohen-Sutherland line-clipping algorithm?
- 2
 - 4
 - 8
 - number of pixels on the line
10. Which of the following is not true about the midpoint circle scan conversion algorithm?
- uses eight-way symmetry
 - the first difference of the decision variable is constant
 - uses only integer arithmetic
 - output may show "staircase effect"



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Fourth Year (Computer Science & Engg.)
First Semester, 2007-2008

Test 1 – Regular (Closed Book)

Course No: CS UC471
Date: 4th Nov 2007
Duration: 50 minutes

Course Title: Computer Graphics
Weightage: 20%
Max. Marks. 20

1. Apply the midpoint circle algorithm, with second order differences, to generate the first four points on the circle $x^2 + y^2 = 25$. **(4 marks)**
2. Sketch the polygon with vertices A(2, 6), B(5, 9), C(7, 2), D(5, 4), and E(4, 1). Show the contents of the edge table used by the scan conversion algorithm for this polygon. Show also how the active edge table changes when y changes from 4 to 5. **(6 marks)**
3. Apply Cohen-Sutherland algorithm for clipping the line joining (0, 3) to (8, 7) against the window with $x_{min} = 2$, $x_{max} = 8$, $y_{min} = 2$, and $y_{max} = 6$. **(6 marks)**
4. A rectangle has diagonally opposite corners (4, 2) and (8, 4) and sides parallel to the coordinate axes. Find a transformation that will scale the rectangle by a factor 2 in the x-direction and 3 in the y-direction with out changing its centre. Express your result as a single 4 x 4 matrix. **(4 marks)**



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Fourth Year (Computer Science)
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Test 2 – (Open Book)

Course No: CS UC471
Date: 13th Dec 2007
Duration: 50 minutes

Course Title: Computer Graphics
Weightage: 20%
Max. Marks. 20

(Text Book and Class Notes may be used.)

Answer ALL questions
4 marks for each question

1. Describe four types of orthographic projections. Mention their properties and the situations where they are useful.
2. List the parameters used in the Synthetic Camera Model for specifying an arbitrary 3D view. Define each parameter and mention its effect on the final image. Give an example.
3. Describe some of the geometric properties of cubic Bezier curves and use these to derive methods for smoothly joining two Bezier curve segments to obtain function and derivative continuity.
4. Explain the parametric representation of surfaces. Describe methods for displaying a line drawing of such a surface and a method for calculating the normal of the surface at any point on it.
5. Compare the advantages and disadvantages of the following solid modeling schemes.
 - a. Sweep Representation
 - b. Boundary Representation
 - c. Octrees
 - d. Constructive Solid Geometry



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Fourth Year (Computer Science)
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Comprehensive Examination

Course No: CS UC471
Date: 6th Jan 2008
Duration: 3 Hours

Course Title: Computer Graphics
Weightage: 40%
Max. Marks. 40

Answer ALL questions
5 marks for each question

1. The scan conversion algorithm for drawing a circle generates directly points in a certain range only. Identify this range. Give reasons for the choice of the range. Describe what method is used for computing points on the rest of the circle.
2. Describe the scan conversion algorithm for polygons. Specify suitable data structures for its efficient implementation. Mention clearly how the algorithm handles special cases of vertices and horizontal edges of the polygon.
3. The Sutherland-Hodgman Polygon-Clipping algorithm uses edge classification as its basis. Describe this classification and justify it with suitable examples. Give one example of a connected polygon which when clipped generates disconnected polygons. How does the algorithm handle such situations?
4. Derive a 2D transformation for reflection along the line joining the points P(a, b) and Q(c, d).
5. An object is contained in the unit cube with diagonally opposite corners at (0, 0, 0) and (1, 1, 1). Specify the viewing parameters for generating the front view of the object assuming that the front face of the object is behind the face of the cube with $z = 1$.
6. Define a cubic Bezier curve and state four important properties of it.
7. For a solid modeling scheme of your choice explain how the following operations can be performed.
 - a. Creation of a new object
 - b. Display of an existing object
 - c. Boolean operations on two objects
8. An object is made up of planar faces. Give a hidden surface algorithm, including back face elimination, for displaying the object. Mention some of the advantages and disadvantages of the algorithm.



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Quiz 3 ~~Quiz~~

Course No: CS UC471
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Course Title: Computer Graphics
Max. Marks. 10

ID No.

Name:

1. Which type of continuity guarantees that the directions, but not the magnitudes, of the two segments' tangent vectors are equal at a join point?
 - a. C^0
 - b. G^0
 - c. C^1
 - d. G^1

2. What is the maximum order of continuity provided by cubic splines?
 - a. C^1
 - b. G^1
 - c. C^2
 - d. G^2

3. Which of the following is not a property of a cubic Bezier curve segment?
 - a. Is defined by four control points.
 - b. Passes through all the control points.
 - c. Lies within the convex hull of the control points.
 - d. Each coordinate is a cubic polynomial in one parameter.

4. What is the expansion of NURBS?
 - a. Non Uniform Rational B Splines
 - b. Nonrational Uniform Relational B Splines
 - c. Nonrational Uniform Relational Beta Splines
 - d. Non Uniform Relational B Splines

5. Which of the following is an advantage of nonuniform splines over uniform splines?
 - a. Continuity at selected join points can be reduced
 - b. Continuity at selected join points can be increased
 - c. Degree of the curve can be increased
 - d. Degree of the curve can be reduced

6. Which of the following does not normally require surface normals?
 - a. Shading the surface
 - b. Interference detection
 - c. Intersection calculation
 - d. Calculating offsets in CNC machining

7. If a given representation corresponds to only one solid, then the scheme is called -----.
 - a. complete
 - b. unique
 - c. homogeneous
 - d. valid

8. Which of the following is not used to define a regularised union operation?
 - a. interior
 - b. exterior
 - c. closure
 - d. union

9. Which solid modeling scheme is best suited for display purposes?
 - a. Constructive Solid Geometry
 - b. Boundary Representation
 - c. Octrees
 - d. Sweep representation

10. Which solid modeling scheme is best suited for Boolean operations?
 - a. Constructive Solid Geometry
 - b. Boundary Representation
 - c. Octrees
 - d. Sweep representation

